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AN OUTLINE OF THE SUBFAMILIES AND HIGHER
GROUPS OF THE INSECT ORDER THYSANOPTERA.

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Not many years ago the order Thysanoptera, when recognized at all, was known as a small group of unimportant insects. In 1907 only about 45 genera and 175 species had been recorded in the scientific literature of the entire world. During the last seven years, however, the activity of specialists has increased the number of known genera to 169 and the known species to 795. Economically, too, the group has come into greater prominence, and the Orange Thrips, Pear Thrips, and Tobacco Thrips have taken a place among the important pests of their respective food plants. The systematic and biological work have each proved a stimulus to the other, and some knowledge of these tiny insects has become necessary to every working entomologist.

With the increase in the size and importance of the group has come the necessity for a more comprehensive classification than that of Uzel, proposed in 1895. Mr. Richard S. Bagnall, in a recent paper (Bagnall, 1912b) has suggested the division of the order into three suborders, one of which he calls *Polystigmata*, in agreement with an opinion which had been expressed by the writer (Hood, 1912). These suborders he further divides into the nine families *Urothripidae*, *Phlæothripidae*, *Ecacanthothripidae*, *Idolothripidae*, *Ælothripidae*, *Heterothripidae*, *Panchæothripidae*, *Ceratothripidae*, and *Thripidae*. Shortly after this Dr. Filip Trybom, in a paper on some Thysanoptera from Natal and the Zululand (Trybom, 1912),

places the suborder Polystigmata Bagnall as a synonym of the suborder Tubulifera Haliday, stating that in his opinion the seven extra abdominal "stigmata" ascribed to that group are not spiracles at all,—a statement which he reiterated in a letter to the writer shortly before his death, in the following words: "It seems to me that the seven extra 'stigmata' are not real spiracular openings (see p. 35 of my named paper). For this reason I have preferred to keep the Urothripidae as a family instead of adopting the new suborder. It may be that I am mistaken, but I have been in a position to examine several specimens" (Trybom, 1913). Trybom's paper was followed by one by Dr. H. Karny (1913), in which the Polystigmata are recognized as a valid suborder and the two additional families Megathripidae and Hystriothripidae proposed. In February, 1914, a twelfth family, the Merothripidae, was proposed by the writer for the reception of an anomalous American genus. The next paper which touches on the general classification of the order was published by Mr. Bagnall in March, 1914, and in it the suborder Terebrantia is divided into two tribes, the *Æolothripides* and the *Thripides*. Finally a thirteenth family, the *Pygothripidae* was erected by the writer for a remarkable Australian form (Hood, 1915).

In the classification proposed below, most of the groups just mentioned have tentatively been accepted by the writer. It seems, however, that the accurate separation of a natural group of organisms, its exact definition, the correct interpretation of its affinities, and its assignment to a true place in the phylogenetic scheme, are impossible until the knowledge of the larger group to which it belongs, and of which it forms an integral part, has become really comprehensive. When finally distinguished, it will be found that the broader groups will be separated by fundamental characters of ancient origin, while the less comprehensive groups will be distinguished by characters of less importance, produced in comparatively recent times. Thus, while we look to color, sculpture, size, and other trivial differences for the separation of species, we expect the definition of larger groups to call into service important differences in the main body itself. The separation of families on sexual characters, on minor antennal differences observed in solitary specimens, and on the relative length of the tenth abdominal

segment, can not prove very satisfactory, striking though such structures may at first appear.

It has been deemed necessary to replace the name *Æolothripides* with *Æolothripoidea*, and *Thripides* with *Thripoidea*, and to alter their designations from "tribe" to "superfamily," in accordance with accepted modern usage as established by Dr. Theodore Gill (1898). The name *Polystigmata* is placed as an unavailable synonym of a new superfamily (*Urothripoidea*) of the *Tubulifera*. The family *Ecacanthothripidæ* is here considered a synonym of the family *Phlæothripidæ*, its distinction having been based on what appear to be minor characters.

Finally, before undertaking the definition of the various groups under consideration, it may be interesting to note that the most generalized superfamily, the *Æolothripoidea*, was proportionately much more abundantly represented in the Tertiary geological epoch than at present, while the specialized *Phlæothripoidea*, which are now probably the most numerous of all, were then represented by only one known species. The *Urothripoidea* are unknown as fossils. The following table, partly from Handlirsch (1908), shows these points very clearly:

	Fossil Species			Totals	Recent Species
	Tertiary		Quaternary		
	Oligocene	Miocene	Pleistocene		
Thysanoptera	22	2	3	27	795
Terebrantia	17	—	—	17	352
<i>Æolothripoidea</i> .	6	—	—	6	28
<i>Thripoidea</i>	11	—	—	11	324
<i>Tubulifera</i>	1	—	—	1	443
<i>Phlæothripoidea</i>	1	—	—	1	438
<i>Urothripoidea</i> . .	—	—	—	—	5
(Unnamed)	4	2	3	9	—

Order THYSANOPTERA Haliday, 1836.

- 1744. Genus *Physapus* De Geer
- 1758. Genus *Thrips* Linné
- 1806. Family *Vesitarses* ou *Physapodes* Duméril
- 1814. Family *Thripsides* Fallén
- 1825. Tribe *Thrypsides*. *Physapi* Latreille
- 1829. Family *Thripidæ* Stephens
- 1835. Order *Thrypsites* Newman
- 1835. Order *Thrypsites* Newman

1836. Order *Thysanoptera* Haliday
 1838. Tribe *Physopoda* Burmeister
 ——— *Thrypsinæ* Blanchard*
 ——— *Malacoptera* Brullé*
 1852. Order *Physapoda* Haliday-Walker
 1855. Order *Thripsina* Newman
 1855. Group *Thripsidæ* Fitch
 1856. Family *Thripididæ* Fitch

Small, slender, usually depressed, Orthopteroid insects, generally capable of flight and frequently saltatorial, feeding on plant-saps and exceptionally on animal juices. Metamorphosis direct; penultimate instar often quiescent. Wings developed gradually and applied externally. Reproduction always oviparous, often parthenogenetic.

Head vertical, moderately movable, usually with large compound eyes and three ocelli. Antennæ slender, four- to nine-segmented. Mouth parts hypognathous, haustellate, conical, asymmetrical, consisting of a triangular labrum fused with the two pairs of maxillæ to form a sheath in which move three piercing bristles.

Prothorax free, movable. Mesothorax and metathorax united, each with a pair of stigmata. Wings often rudimentary or lacking, four in number, nearly similar, slender, with few or no veins, and closely fringed with very long hairs. Tarsi one- or two-segmented, with one or two claws, between which is a bladder-like organ.

Abdomen ten-segmented, terminal segment often tubular; first segment short, more or less united with the thorax. Ovipositor, when present, consisting of two pairs of gonapophyses pertaining to segments 8 and 9. Stigmata present on abdominal segments 1 and 8.

The writer has followed previous authors in employing the name *Thysanoptera* in preference to the earlier name *Thripsites* (or *Thrypsites*), because it is definitive, more satisfactorily formed, and is in general acceptance by entomologists. It has two years priority over *Physopoda*, which would otherwise, perhaps, be a more satisfactory term than either.

KEY TO SUBFAMILIES AND HIGHER GROUPS.

I.—Female with an ovipositor formed of two pairs of gonapophyses arising from segments 8 and 9 of abdomen; terminal abdominal segment seldom tubular, that of female longitudinally divided beneath and usually conical, that of male usually bluntly rounded, never tubular. Wings microscopically pubescent; fore wing with marginal vein and at least one longitudinal vein attaining tip.

Suborder TEREBRANTIA Haliday, 1836.
 (=Suborder *Thripoidæ* Karny, 1907.)

A.—Ovipositor curved upward. Wings broad and rounded at tip.
 Body not depressed. Antennæ nine-segmented.

Superfamily ÆOLOTHRIPOIDEA NOV.
 (=Tribe *Æolothripides* Bagnall, 1914.)

* I have been unable to locate the places of publication of these names.

- a.—One family of world-wide distribution, comprising 3 genera and 6 species of fossil forms;* in addition to the recent ones.

Family *ÆOLOTHRIPIDÆ* Uzel, 1895.

(=Family *Coleoptrata* Haliday, 1836.)

(=Family *Coleoptratidæ* Beach, 1896.)

- b.—Labial palpi with fewer segments than the maxillary palpi; antennal segments often freely movable.

c.—Maxillary palpi 7 or 8 segmented; labial palpi 3-5 segmented. (4 monotypic recent genera, from North America and Australia†) . . . Subfamily *OROTHIRIPINÆ* Bagnall, 1913.

- cc.—Maxillary palpi 3 segmented; labial palpi 2 segmented. (2 genera, with 6 recent and 1 fossil species, recorded from Europe, Africa, and North America.)

Subfamily *MELANOTHRIPINÆ* Bagnall, 1913.

- bb.—Labial palpi 4 segmented; maxillary palpi 3 segmented; distal segments of antennæ always closely united. (4 genera and 18 species, all recent, recorded from Europe, Africa, and North, Middle, and South America.)

Subfamily *ÆOLOTHRIPINÆ* Bagnall, 1913.

- AA.—Ovipositor curved downward. Wings narrower, almost always pointed at tip. Body more or less depressed. Antennæ 6 to 8 segmented (except in *Heterothripidæ*). . . Superfamily *THRIPIDEA* NOV.

(=Tribe *Thripides* Bagnall, 1914.)

- b.—Antennæ 9 segmented, without apical stylus; segments 3 and 4 enlarged, conical, without sense cones but with sensory band at apex. Fore tarsus with claw-like appendage at base of second segment. (One genus with 6 recent species, known from North and South America and the West Indies.)

Family *HETEROTHRIPIDÆ* Bagnall, 1912.

- bb.—Antennæ six- to eight-segmented, usually with an apical stylus of one or two segments; segments 3 and 4 not conical, usually with sense cones, rarely with a sensory band at apex. Fore tarsus never with an appendage at base of second segment.

c.—Antennæ not moniliform, six- to eight-segmented, always with an apical stylus of one or two segments; segment 3 usually, and 4 always, with sense cones, never with a tympanum-like sense area on dorsum of apex. Pronotum without longitudinal dorsal sutures; anterior and posterior femora not enlarged. Abdomen usually sharply conical at tip; ovipositor almost invariably well developed.

- d.—Sixth antennal segment large, never minute in comparison with fifth, generally the largest in entire antenna.

* It has been impossible to assign all of these fossil species to the subfamilies indicated below.

† The *Orothrips australis* Bagnall (Ann. Mag. Nat. Hist., 8th Ser., Vol. 13, p. 287; March, 1914) is not congeneric with the North American *Orothrips kelloggii* Moulton, the type of the genus, and for its reception the new name *Desmothrips* is hereby proposed. From *Orothrips* this new genus may readily be separated by the closely united fifth to ninth antennal segments, the single sense areas on segments 3 and 4, and the much narrower body and wings.

e.—Last segment of abdomen of female conical, not heavily chitinized, seldom stronger than the preceding segments, bristles on segments 9 and 10 not exceedingly long nor stout, never thorn-like. (One of the largest families of the order, containing about 54 genera and 312 recent species, found in all parts of the world; 11 fossil species.)

Family THRIPIDÆ Uzel, 1895.

(=Family *Stenelytra* Haliday, 1836.)

(= *Stenoptera* Burmeister, 1838.)

(=Family *Stenopteridæ* Beach, 1896).

ee.—Last segment of abdomen of female cylindrical, very heavily chitinized, bristles on segments 9 and 10 exceptionally long and stout, thorn-like. (3 monotypic recent genera, from India, Porto Rico and Africa.)

Family PANCHÆOTHRIPIDÆ Bagnall, 1912.

(=Subfamily *Panchæothripinæ* Bagnall, 1912.)

dd.—Sixth segment of antenna small, styliform, minute in comparison with the fifth, which is the largest in entire antenna. (One genus of doubtful standing, comprising two recent European species, each of which is known from a single specimen.) . Family CERATOTHRIPIDÆ Bagnall, 1912.

cc.—Antennæ moniliform, eight-segmented, without apical stylus; segments 3 and 4 without sense cones, each with a tympanum-like sense area on dorsum of apex. Pronotum with longitudinal dorsal sutures; anterior and posterior femora greatly enlarged. Abdomen blunt; ovipositor very weak, probably functionless. (One recent monotypic genus, known only from the United States.)

Family MEROTHRIPIDÆ Hood, 1914.

II.—Female without ovipositor; terminal abdominal segment of both sexes always continuous beneath, almost invariably tubular. Wings without pubescence; fore wing with at most a single, abbreviated, median vein Suborder TUBULIFERA Haliday, 1836.

(=Suborder *Phlæothripoidea* Karny, 1907.)

f.—Maxillary palpi two-segmented. Antennæ seven or eight-segmented. Middle coxæ more widely separated than front or hind pairs. Ninth abdominal segment not or rarely longer than 8; terminal abdominal hairs rarely much longer than tube.

Superfamily PHLÆOTHRIPOIDEA NOV.

g.—Head not produced in front beyond eyes; vertex not sharply conical, rarely prominently overhanging base of antennæ.

h.—Male without a tube-like projection on each side of segment 6 of abdomen.

i.—Last abdominal segment not greatly elongate, never three or four times as long as head nor nearly equal in length to abdomen.

j.—Last abdominal segment tubular in form, sides slightly converging to apex; tergum of abdominal segments 2-9 not transversely linear, 9 usually but little wider than long. (About 75 genera and 368 species, of which one is fossil, represented in all parts of the world.) . . Family *PHLÆOTHIRIPIDÆ* Uzel, 1895.
 (=Family *Tubuliferidæ* Beach, 1896.)
 (=Family *Ecacanthothripidæ*
 Bagnall, 1912, pars.)

jj.—Last abdominal segment not at all tubular in form, greatly swollen, parabolic in dorsal aspect; tergum of abdominal segments 2-9 transversely linear, in the only known genus fully five times as wide as median length. (One recent genus and species of unknown habits, from Australia.)

Family *PYGOTHRIPIDÆ* Hood, 1915.

ii.—Last abdominal segment (the tube) greatly elongate, three or four times as long as head and nearly or quite equal in length to the remainder of abdomen. (3 genera, with 4 (possibly 5) recent Ethiopian and Oriental species.)

Family *HYSTRICOTHRIPIDÆ* Karny, 1913.

hh.—Male with a stout, tube-like projection on each side of segment 6 of abdomen. (5 genera, embracing 12 recent species of large size, now known from almost all parts of the world.)

Family *MEGATHRIPIDÆ* Karny, 1913.

gg.—Head more or less produced in front beyond eyes; vertex conical, usually prominently overhanging base of antennæ, bearing the anterior ocellus at its extremity, and usually with a strong bristle in front of eye. (11 genera and 55 species, all recent; the giants of the order, represented in all regions except the Palæartic.)

Family *IDOLOTHRIPIDÆ* Bagnall, 1908.

ff.—Maxillary palpi one-segmented. Antennæ four- to seven-segmented. Hind coxæ more widely separated than front or middle pairs. Ninth abdominal segment longer than 8; terminal abdominal hairs very much longer than tube . . . Superfamily *UROTHRIPIDOIDEA* nov.

(=Suborder *Polystigmata* Bagnall, 1912.)

k.—One family, from Africa and southern Europe, comprising 4 genera and 5 species, all recent.

Family *UROTHRIPIDÆ* Bagnall, 1909.

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